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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/902,439	07/10/2001	Arcangelo Bruna	00CT11153298	5514

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EXAMINER	
CHEN, WENPENG	
ART UNIT	**PAPER NUMBER**
2624	

DATE MAILED: 05/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/902,439	BRUNA ET AL.	
	Examiner	Art Unit	
	Wenpeng Chen	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 November 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *16-50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *28-34* is/are allowed.

6)☒ Claim(s) *16,22-24,26,27,35,36,43,44 and 48-50* is/are rejected.

7)☒ Claim(s) *17-21,25,37-42,46 and 47* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Examiner's responses to Applicant's remark

1. Applicants' arguments filed on 11/18/2004 have been fully considered.

-- The Applicants did not respond to the objection to specification set forth in paper #6. The objection remains.

-- The Applicants stated in REMARKS filed on 11/18/2004 that Claim 43 has been amended. Actually it is not amended as shown in page 13 of the response filed on 11/18/2004. No arguments are provided for rejection of the original Claim 43. The Examiner maintains the rejection to Claims 43-44 and 48-49 set forth in paper #6.

-- Applicants' arguments with respect to Claims 16, 35, and their dependent claims have been considered but are moot in view of the new ground(s) of rejection due to the amendments that change scope of the claims.

-- Because new grounds of rejections are needed to reject Claims 24 and 50, the Office Action is made non-final.

Specification

2. The disclosure remains objected to because of the following informalities. (See paragraph 1 of paper #6 please.)

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 35-42 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for the following reasons.

There are insufficient antecedent bases for the following limitations.

-- Claim 35 recites the limitation "the gain factor" in line 7.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 43-44 and 48-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ukita et al. (US patent 6,424,739 cited previously) in view of Nakagawa et al. ("DCT-based still image compression ICs with bit-rate control," Nakagawa, Masaki, et al. IEEE Trans. On Consumer Electronics, v. 38, no. 3, August 1992, pages 711-712 cited in IDS paper #4.)

Ukita teaches a digital still camera comprising:

-- an image acquisition unit for transmitting light corresponding to an image of scene; (column 4, line 36 to column 7, line 9)

-- a sensor unit connected to said image acquisition unit for providing a digital image of scene, the digital image comprising a matrix of elements, each element comprising at least one digital component for representing a pixel, wherein each element comprises a plurality of digital components of different types and wherein each element the digital image comprises a luminance component, a first chrominance component, and a second chrominance component; (column 4, line 36 to column 7, line 9)

-- a control device for compressing the digital image JPEG. (column 4, line 36 to column 7, line 9)

However, Ukita does not teach the details of providing target compression factor and compress the data with the factor as recited in Claim 43.

Nakagawa teaches a device for compressing a digital image comprising a matrix of elements, each element comprising a plurality of digital components different types for representing a pixel, the device comprising:

-- discrete cosine transform (DCT) means for splitting digital image a plurality of blocks, and calculating for each block a group of coefficients for the digital components of different types; (right column, page 711, left column, page 712, Fig. 4)

-- quantization means connected said DCT means for quantizing the DCT coefficients for each block using a corresponding quantization table scaled by a gain factor for achieving a target compression factor; ("quantizer" of Fig. 4)

-- energy means for determining at least one energy measure digital image; ("block activity" in Fig. 4; right column, page 713; section 4-2 Activity in page 714))

-- estimation means for estimating the gain factor as function the at least one energy measure, the function being determined experimentally according to the target compression factor; (sections 4-3, and 4-4 in pages 714-715; Fig. 6; The K value is the gain factor.)

-- wherein said DCT means define a compression unit; wherein said estimation means comprises a processor controlling compression of the digital image; the device further comprising: (1) a memory for storing the quantization tables (right column, page 713; Fig. 5; the tables being stored in a ROM) and (2) communication means for connecting said compression unit, said memory, energy means and said processor together, said processor estimating the gain factor based upon a program stored said memory; (Figs. 1 and 4; right column, page 713; section system composition; At least, the program is stored in the CPU.)

-- all the means are at least operated by circuits or processor; (section 3, page 712.)

-- wherein the at least one energy measure comprises a total energy measure equal to a sum of an energy measure of the luminance components, an energy measure of the first chrominance components and an energy measure of the second chrominance components. (equation (5) in page 714)

It is desirable to control the size of compressed image with target compression in digital cameras so a user can expect to store a predefined number of pictures into a fixed-size memory. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to use Nakagawa's compression system in Ukita's JPEG block to determine and use the target Q factor to achieve target compression because the combination enables a user to store a predefined number of pictures into a fixed-size memory.

7. Claims 16, 22-23, and 35-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagawa et al. ("DCT-based still image compression ICs with bit-rate control," Nakagawa, Masaki, et al. IEEE Trans. On Consumer Electronics, v. 38, no. 3, August 1992, pages 711-712 cited in IDS paper #4) in view of Watanabe et al. (US patent 5,051,840, hereafter referred as Watanabe 840.)

For Claims 35-36, Nakagawa teaches a device for compressing a digital image comprising a matrix of elements, each element comprising a plurality of digital components different types for representing a pixel, the device comprising:

-- energy means for determining at least one energy measure of the digital image; ("block activity" in Fig. 4; right column, page 713; section 4-2 Activity in page 714))

-- estimation means for estimating a gain factor as function the at least one energy measure, the function being determined experimentally according to the target compression factor; (sections 4-3 and 4-4 in pages 714-715; Fig. 6; The K value is the gain factor.)

-- discrete cosine transform (DCT) means for splitting digital image a plurality of blocks, and calculating for each block a group of coefficients for the digital components of different types; (right column, page 711, left column, page 712, Fig. 4)

-- quantization means connected said DCT means for quantizing the DCT coefficients for each block using a corresponding quantization table scaled by a gain factor for achieving a target compression factor; ("quantizer" of Fig. 4)

-- wherein said DCT means define a compression unit; wherein said estimation means comprises a processor controlling compression of the digital image; the device further

comprising: (1) a memory for storing the quantization tables (right column, page 713; Fig. 5; the tables being stored in a ROM) and (2) communication means for connecting said compression unit, said memory, energy means and said processor together, said processor estimating the gain factor based upon a program stored said memory; (Figs. 1 and 4; right column, page 713; section system composition; At least, the program is stored in the CPU.)

-- wherein the energy means determines the at least one energy measure using the plurality of digital components. (equation (5) in page 714)

However, Nakagawa does not teach that the energy means determines the energy measure in a pixel domain.

Watanabe 840 teaches a compression device having a rate control capability comprising:

-- energy means determining at least one energy measure in a pixel domain using the plurality of digital components. (column 3, line 64 to column 5, line 16; column 13, lines 9-29; The activity is the energy measure.) .

It is desirable to (1) use various energy measures, including both obtained in DCT and digital domains, to provide system flexibility and (2) reduce usage of buffer (column 10, lines 17-21 of Watanabe 840) in controlling compression rate. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply the teaching of Watanabe 840 to move Nakagawa's energy means as shown in Fig. 1 before DCT operation because the combination (1) broaden application of Nakagawa's device and (2) reduce buffer requirement in Nakagawa's device.

The above-discussed combinations also teach the method of Claim 16.

With regard to Claims 22-23, Nakagawa further teaches:

-- wherein each element of the digital image comprises a luminance component, a first chrominance component, and a second chrominance component; (See Y, Cb, and Cr in Table 1.)

-- wherein the at least one energy measure comprises a total energy measure equal to a sum of an energy measure of the luminance components, an energy measure of the first chrominance components and an energy measure of the second chrominance components. (equation (5) in page 714)

The above-discussed combinations also teach Claims 22-23.

8. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Nakagawa and Watanabe 840 as applied to Claim 23, and further in view of Watanabe et al. (US patent 5,732,156, hereafter referred as Watanabe 156.)

The combination of Nakagawa and Watanabe 840 teaches the parental Claim 23.

Watanabe 840 further teaches a step of calculating energy (activity) of an image comprising:

-- calculating a horizontal Sobel image and a vertical Sobel image by convolution of the elements of the digital image comprising a type of component with a horizontal mask and a vertical mask, respectively. (column 4, line 60 to column 5, line 16; Figs. 4B and 4C.)

However, it does not teach the features related to summing Sobel images recited in Claim 24.

Watanabe 156 teaches calculating activity (energy) of an image comprising:

-- calculating a total Sobel image by summing horizontal Sobel image and the vertical Sobel image; (column 5, lines 1-4)

-- summing an absolute value of each element of the total Sobel image.

It is desirable to use various methods for determining energy of image to provide flexibility of bit rate control. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to add the approach taught by Watanabe 156 as an alternative of estimating energy of image used in the method taught by the combination of Nakagawa and Watanabe 840, because the overall combination provides flexibility of bit rate control.

9. Claims 26-27, 43-44 and 48-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ukita et al. (US patent 6,424,739) in view of the combination of Nakagawa et al. ("DCT-based still image compression ICs with bit-rate control," Nakagawa, Masaki, et al. IEEE Trans. On Consumer Electronics, v. 38, no. 3, August 1992, pages 711-712 cited in IDS paper #4) and Watanabe 840.

Ukita teaches a digital still camera comprising:

-- an image acquisition unit for transmitting light corresponding to an image of scene; (column 4, line 36 to column 7, line 9)

-- a sensor unit connected to said image acquisition unit for providing a digital image of scene, the digital image comprising a matrix of elements, each element comprising at least one digital component for representing a pixel, wherein each element comprises a plurality of digital components of different types and wherein each element the digital image comprises a luminance component, a first chrominance component, and a second chrominance component; (column 4, line 36 to column 7, line 9)

-- a control device for compressing the digital image JPEG. (column 4, line 36 to column 7, line 9)

However, Ukita does not teach the details of providing target compression factor and compress the data with the factor as recited in Claim 43.

As explained above, the combination of Nakagawa and Watanabe 840 teaches Claims 16 and 35. The details are discussed below.

Nakagawa teaches a device for compressing a digital image comprising a matrix of elements, each element comprising a plurality of digital components different types for representing a pixel, the device comprising:

-- discrete cosine transform (DCT) means for splitting digital image a plurality of blocks, and calculating for each block a group of coefficients for the digital components of different types; (right column, page 711, left column, page 712, Fig. 4)

-- quantization means connected said DCT means for quantizing the DCT coefficients for each block using a corresponding quantization table scaled by a gain factor for achieving a target compression factor; ("quantizer" of Fig. 4)

-- energy means for determining at least one energy measure digital image; ("block activity" in Fig. 4; right column, page 713; section 4-2 Activity in page 714))

-- estimation means for estimating the gain factor as function the at least one energy measure, the function being determined experimentally according to the target compression factor; (sections 4-3, and 4-4 in pages 714-715; Fig. 6; The K value is the gain factor.)

-- wherein said DCT means define a compression unit; wherein said estimation means comprises a processor controlling compression of the digital image; the device further comprising: (1) a memory for storing the quantization tables (right column, page 713; Fig. 5; the tables being stored in a ROM) and (2) communication means for connecting said compression

unit, said memory, energy means and said processor together, said processor estimating the gain factor based upon a program stored said memory; (Figs. 1 and 4; right column, page 713; section system composition; At least, the program is stored in the CPU.)

-- all the means are at least operated by circuits or processor; (section 3, page 712.)

-- wherein the at least one energy measure comprises a total energy measure equal to a sum of an energy measure of the luminance components, an energy measure of the first chrominance components and an energy measure of the second chrominance components. (equation (5) in page 714)

However, Nakagawa does not teach that the energy circuit determines the energy measure in a pixel domain.

Watanabe 840 teaches a compression device having a rate control capability comprising:

-- energy means determining at least one energy measure in a pixel domain using the plurality of digital components. (column 3, line 64 to column 5, line 16; column 13, lines 9-29; The activity is the energy measure.)

It is desirable to (1) use various energy measures, including both obtained in DCT and digital domains, to provide system flexibility and (2) reduce usage of buffer (column 10, lines 17-21 of Watanabe 840) in controlling compression rate. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply the teaching of Watanabe 840 to move Nakagawa's energy means as shown in Fig. 1 before DCT operation because the combination (1) broaden application of Nakagawa's device and (2) reduce buffer requirement in Nakagawa's device.

It is further desirable to control the size of compressed image with target compression in digital cameras so a user can expect to store a predefined number of pictures into a fixed-size

memory. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to use the compression system taught by the combination of Nakagawa and Watanabe 840 in Ukita's JPEG block to determine and use the target Q factor to achieve target compression because the overall combination enables a user to store a predefined number of pictures into a fixed-size memory.

For Claims 26-27, Ukita further teaches:

-- providing an incomplete digital image with least component missing in each element; obtaining the digital image from the incomplete digital image. (column 8, lines 47-54)

For Claims 26-27, Nakagawa further teaches:

-- storing digital image in a memory and concurrently performing the determining of the at least one energy measure and the estimating the gain factor; and reading digital image from the memory for performing the splitting of the digital image and the quantizing the DCT coefficients. (left column, page 712; the image data being stored in the frame memory)

The overall combination thus teaches:

-- providing an incomplete digital image with least component missing in each element; obtaining the digital image from the incomplete digital image; storing digital image in a memory and concurrently performing the determining of the at least one energy measure and the estimating the gain factor; and reading digital image from the memory for performing the splitting of the digital image and the quantizing the DCT coefficients;

-- providing an incomplete digital image with at least one component missing in each element; obtaining the digital image from the incomplete digital image for performing the determining of the least one energy measure and the estimating of the gain factor; obtaining digital image from the incomplete digital image again performing the splitting the digital image and the quantizing of DCT coefficients.

10. Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Ukita, Nakagawa and Watanabe 840 as applied to Claim 49, and further in view of Watanabe et al. (US patent 5,732,156, hereafter referred as Watanabe 156.)

The combination of Ukita, Nakagawa and Watanabe 840 teaches the parental Claim 49.

Watanabe 840 further teaches a step of calculating energy (activity) of an image comprising:

-- calculating a horizontal Sobel image and a vertical Sobel image by convolution of the elements of the digital image comprising a type of component with a horizontal mask and a vertical mask, respectively. (column 4, line 60 to column 5, line 16; Figs. 4B and 4C.)

However, it does not teach the features related to summing Sobel images recited in Claim 24.

Watanabe 156 teaches calculating activity (energy) of an image comprising:

-- calculating a total Sobel image by summing horizontal Sobel image and the vertical Sobel image; (column 5, lines 1-4)

-- summing an absolute value of each element of the total Sobel image.

It is desirable to use various methods for determining energy of image to provide flexibility of bit rate control. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to add the approach taught by Watanabe 156 as an alternative of estimating energy of image used in the method taught by the combination of Ukita, Nakagawa and Watanabe 840, because the overall combination provides flexibility of bit rate control.

Allowable Subject Matter

11. Claims 17-21, 37-42 and 45-47 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

A statement of reasons for the indication of allowable subject matter has been given in paper #6.

12. Claim 25 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter. The prior art fails to teach the method of Claim 25 that specifically comprise the following features in combination with other recited limitations:

-- wherein at least one quantization table is asymmetric along a horizontal direction and a vertical direction , the method further comprising ***multiplying the Sobel image associated with the at least one quantization table by a correction factor for compensating the asymmetry of the corresponding quantization table***.

13. Claims 28-34 allowed.

A statement of reasons for the indication of allowable subject matter has been given in paper #6.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wenpeng Chen whose telephone number is 571-272-7431. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K Moore can be reached on 571-272-7437. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9306 for After Final communications. TC 2600's customer service number is 571-272-2600.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2600.

Wenpeng Chen
Examiner
Art Unit 2624

May 5, 2005